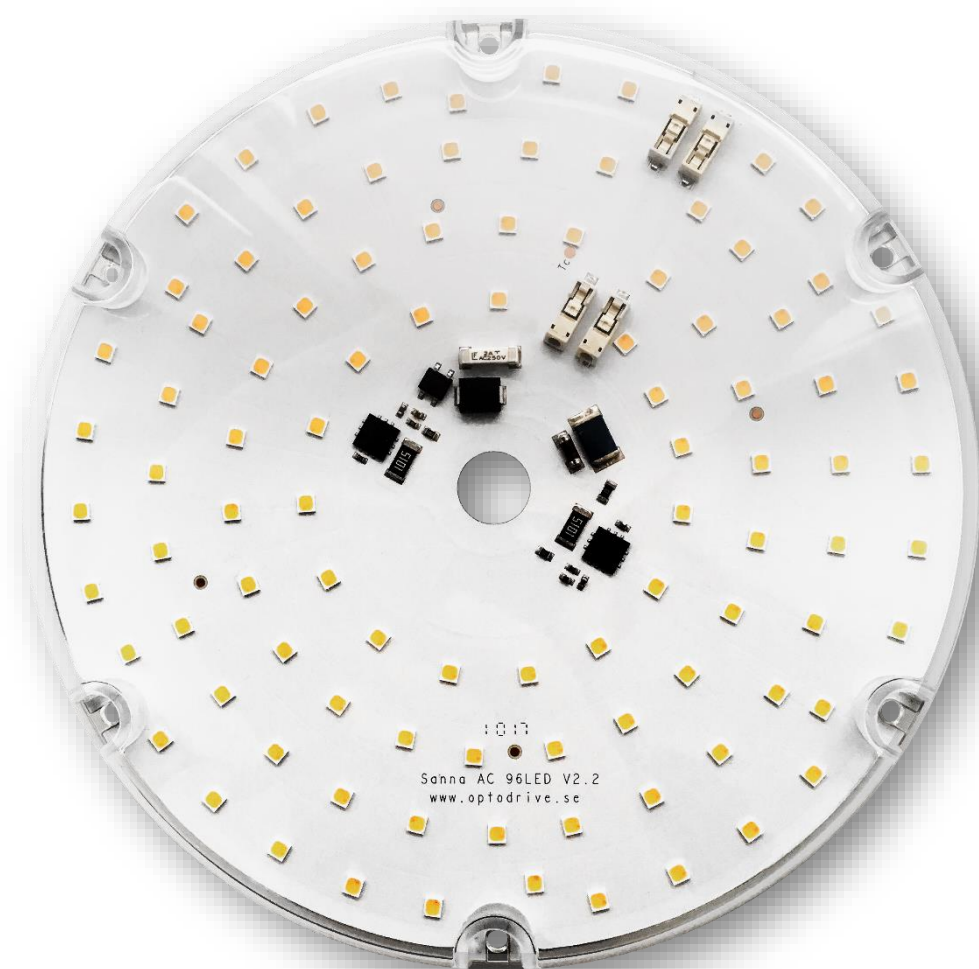


SANNA AC HCL



SANNA AC HCL and TW

Round LED-module for lightings with opalized glass.

No driver is required

Key features

The LED module is named SANNA and it is designed for mid-sized lightings with opalized glass. It can be used for ceiling lamps or wall lamps, as well as bigger pendulums.

The boundary between what is a luminaire and what is a system (of luminaires) is opened up. The control systems behind the luminaires are becoming increasingly complex and enable personal and intuitive lighting solutions. There are really no restrictions beyond how and in what way the light from these LED Modules can be controlled.

Key features

- Made for mid-sized lightings with opalized glass.
- Ready for Tuneable White or Human Centric Lighting
- Even light distribution
- No need for a driver
- Integrated cover
- Simple integration
- Can be used with DALI and Casambi





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Köpingsvägen 4
SE-732 31 ARBOGA

Ph: +46 (0)589-490 950
Fax: +46 (0)589-490 950

Web: www.optoga.se
E-mail: info@optoga.se



Introduction

Sanna package with HCL/TW

The solution is developed to make it easy for the designers and engineers, with double connectors for wires and a hole for center mounting it is well equipped for flexible and safe mounting.

If you want to dim with ordinary dimmers, they work exactly as they are, but in this case its not possible any more. This light source is designed to be more intelligent, a sugar-bite-sized unit called DimIn is fitted with the option of DALI, Casambi or another communication protocol.

The light-engine is a round LED-light engine for pendants with a centered hole for wires. Wires are easily inserted into poke-in connectors. DALI and Casambi and other Eco-Systems of communications can easily be integrated. All IoT LED Modules have an electrical insulated heat PAD mounted to be able to manage Class II light fitting installations.

AC design

All driver and dimmer components are built-in.

The advantage with an 230VAC driver that has been built-in is:

- Lifetime – Connected to a heat sink and therefore has a controlled environment
- Dimming – With DALI or Casambi
- Small – No extra boxes
- Simple – Easily adapted into to the production line

Light output

Colour stability is important to ensure that the installation has a uniform light output. Parameters such as binning, lifetime and thermal control are vital for good results.



Short form Characteristics

MECHANICAL		12W version
Module dimension with cover		158.5 mm diameter
Weight		TBD
Assembly holes		6 x M3
Wire connector		Poke in
ELECTRICAL		
Power		12W
Input voltage		230VAC
Input voltage range		220-240VAC
Power factor		0.80
Total harmonic distortion		<15%
Type of current		AC
Peak inrush current		< 600mA
Inrush current duration		< 35µs
Surge protection		1500V
Fast transient burst		2000V
Over temp. protection		150°C
Energy Class	CRI90 3000K	F
PHOTOMETRICAL		
Flux nominal		900lm
Efficiency		>65-85lm/W
Number of LED's		120
Rendering index		>Ra96-99
SDCM (Mac Adam)		3
SVM		0.5
PstLM		0.6
Spread angle lens		130°
Colour temperatures		2700K-6000K
ENVIRONMENTAL		
Temperature range		-40°C to 65°C (Absolute maximum temp Tc 65°C)
Relative Humidity		10-75%
Ambient air pressure		500-1060 hPa
LIFE LENGHT		
Life length L70B10		>50 000h

*Specifications are valid for >Ra90.



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Article number structure

Sanna158 AC.20.230.120.8yy-NN.FF.IOT

AC	AC= 230VAC, ED=External Driver required, ID=Internal Driver
P	Power (Watt)
V	Voltage: 230VAC
N	Amount of LEDs
8	CRI: 8=Ra>80, 9=Ra>90
YY	CCT: 27 =2700K, 30 =3000K, 40 =4000K 2760=CCT changeable
NN	Viewing angle code
FF	Flickerfree to meet EPREL 2021
IOT	Possibility to connect Casambi and DALI

Article name and versions

ARTICLE NAME	POWER	CURRENT	LEDS	CRI	CCT	LENS
SANNA158 AC.20.230.120.92760-130.FF.IOT	10-14	230	90	90	2700	130°

Ordering data

Sanna AC – Packaging information

Description	Qty (pcs)	Dimension (cm)			GW (kg)
		Length	Width	Height	
Inner box	8	35.6	22.7	9.6	
Outer box	64	46.5	37.5	39.6	12.4



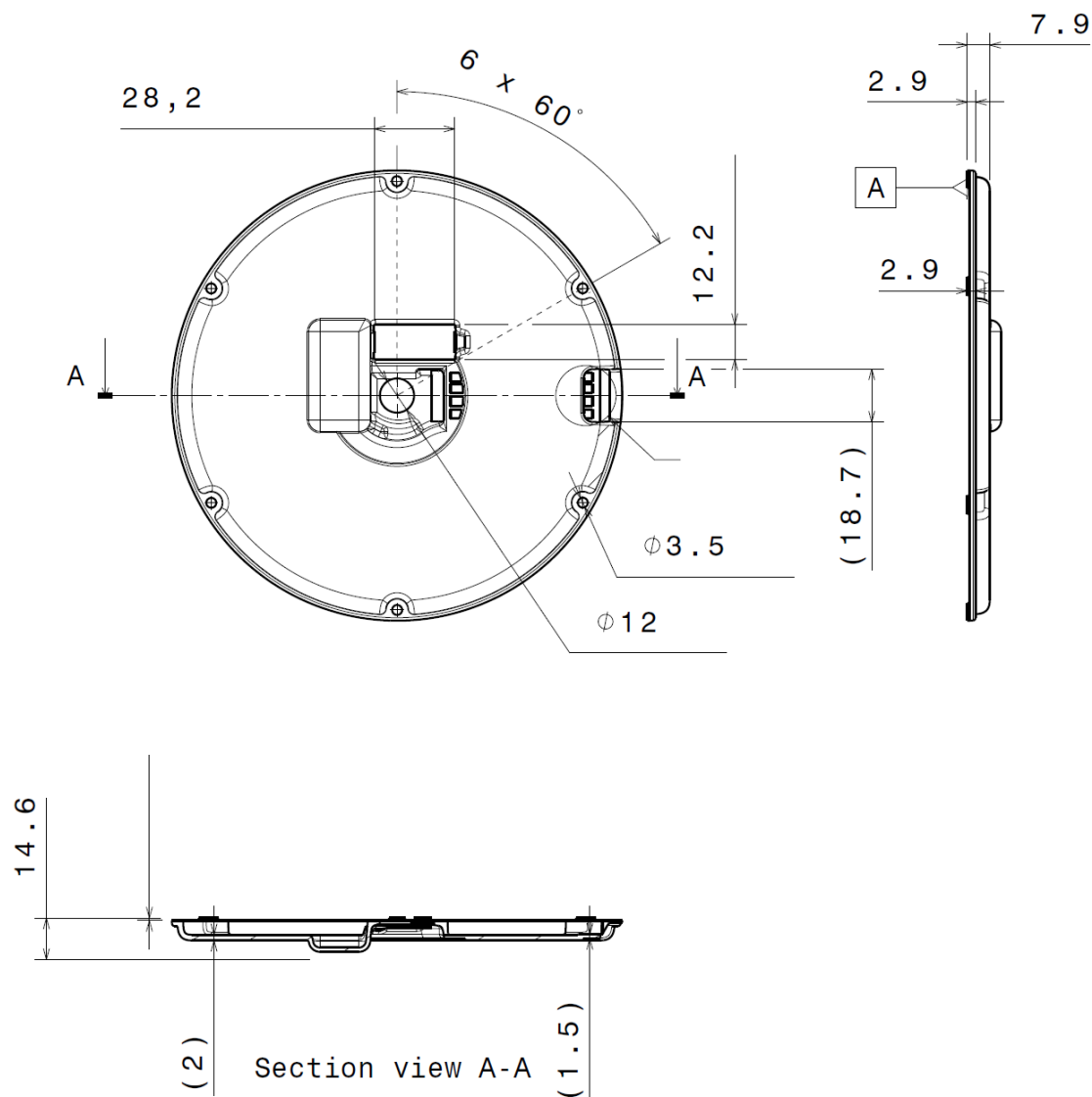
Köpingsvägen 4
SE-732 31 ARBOGA

Ph: +46 (0)589-490 950
Fax: +46 (0)589-490 950

Web: www.optoga.se
E-mail: info@optoga.se

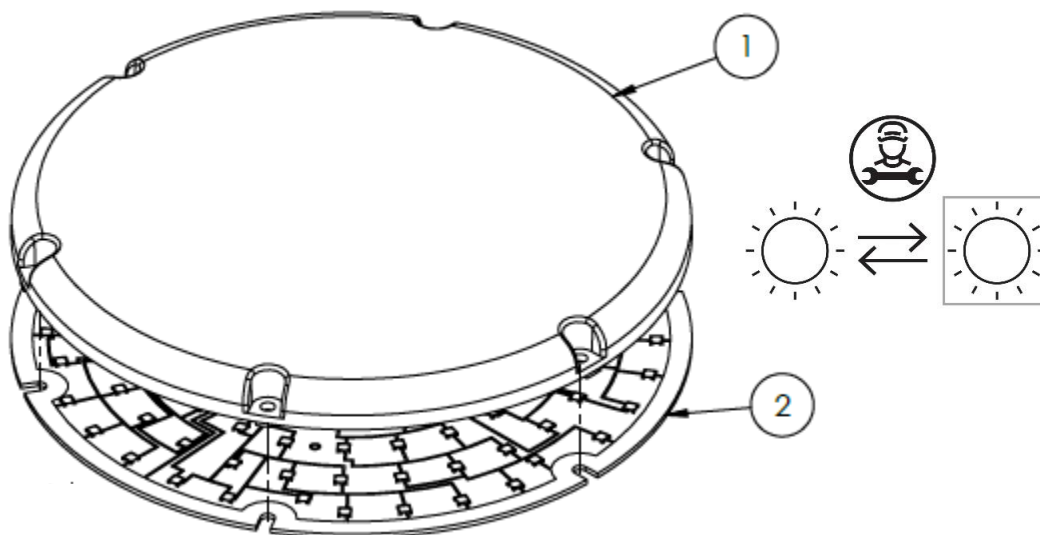
Dimensions

LED-module



Mounting and de-mounting instructions

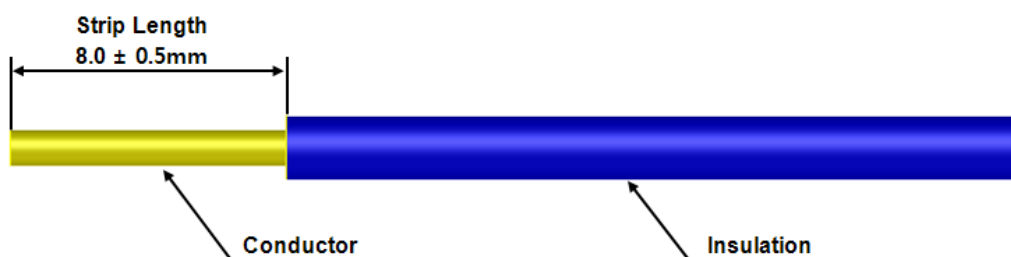
The LED module is to be fixated with screws before the wire connection is made. Never connect or disconnect the LED module with the power ON. Read the information under "Precautions for use" before handling the device.




1. Sanna cover
2. Sanna PCB

Wiring

Type of wire	AWG	mm ²
Stranded	22-20	0.32-0.5mm ²
Solid	24-18	0.51-1.02Ø (0.2-0.8mm ²)
Insulation diameter	Max 2.1 mm	










DimIn (retrofit mountable functionality device)

Article code	ARTICLE NAME	DimIn design
105117	DimIn DALI DT8	
105111	DimIn Casambi	

IoT area for Smart Lighting

Smart LED Engines is a game changer for light and luminaire designers. Now, DALI and Casambi can be combined in lighting controls and lighting designers can build flexibility into how spaces are lit from the beginning to provide an immersive and interactive experience. Optoga makes it possible to use smart lighting and combine DALI with Casambi directly in the lighting to take your design to the next level. Wouldn't you like to have smart lighting built into your LED module right from the start?

We will work with the small sugar-cube sized device as a functionality module that fits into our IoT interface. They are all interchangeable between each other. All devices have mains (Neutral and Live 230VAC) connected. Plus, two wires more, that can be connected and those two can either be DALI or two wires going out to a potentiometer, switch or similar.

Platform	Table- or freestanding light 	Downlight 	Spotlight 	Pendent 	Medium size Opaque glass 	Medium size Opaque glass HCL/TW 	Big size Opaque glass 
Lilly80 AC IoT	X	X		X	X		
ADA AC IoT	X	X	X	X			
Sanna158 IoT	X			X	X		
Sanna158 AC IoT HCL				X		X	
Sannaz90 IoT				X			X

DALI

This is a bus-powered device and it works with the Eco-System DALI-2.

Wire Connections (DALI or other)

Connect BUS control cables from the DALI control unit or Master unit (standard product that Optoga does not supply) or cables from DimIn Pot to D + and D- on the LED module. This depends on whether there is a DALI or DimIn Pot module mounted on the LED module.

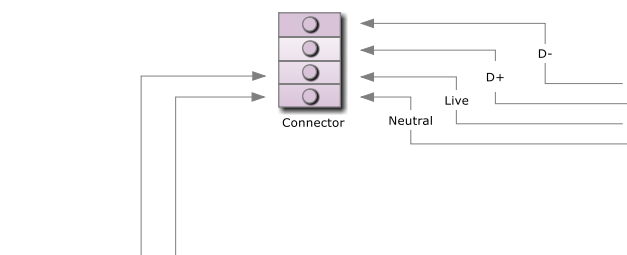
DALI is polarity independent so it does not matter which of D + and D- is connected.

CASAMBI

Most Casambi users know that smart lighting is not just about dimming or turning wireless on and off. Smart lighting is connected and intelligent so that it can change in brightness or color in response to all kinds of information. It can also be used to save energy, to enable dynamic light and to provide "human-centered lighting" that promotes well-being. An increasing amount of scientific evidence shows that this can make workplaces and schools more productive by improving vigilance.

Wiring for different DimIn versions

Casambi



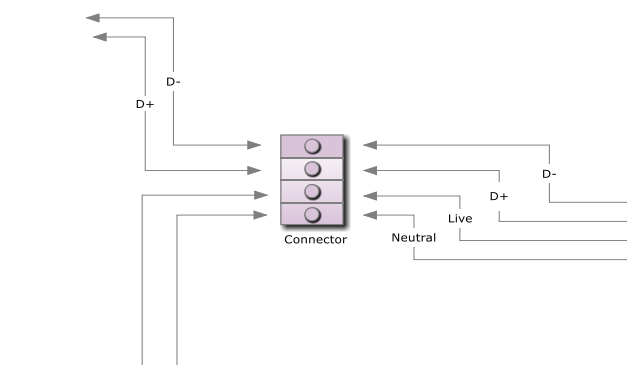
Incoming Wires 110/230VAC

LED Module with IoT (DimIn Casambi)



DALI

DALI BUS Incoming

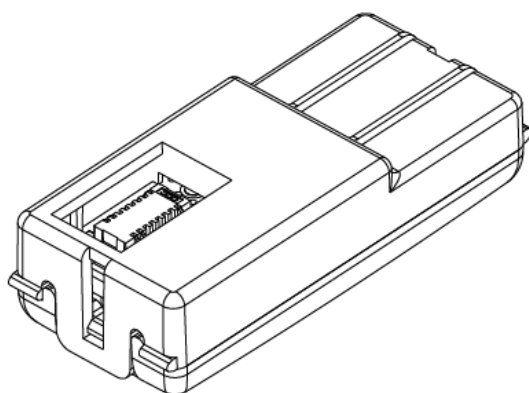
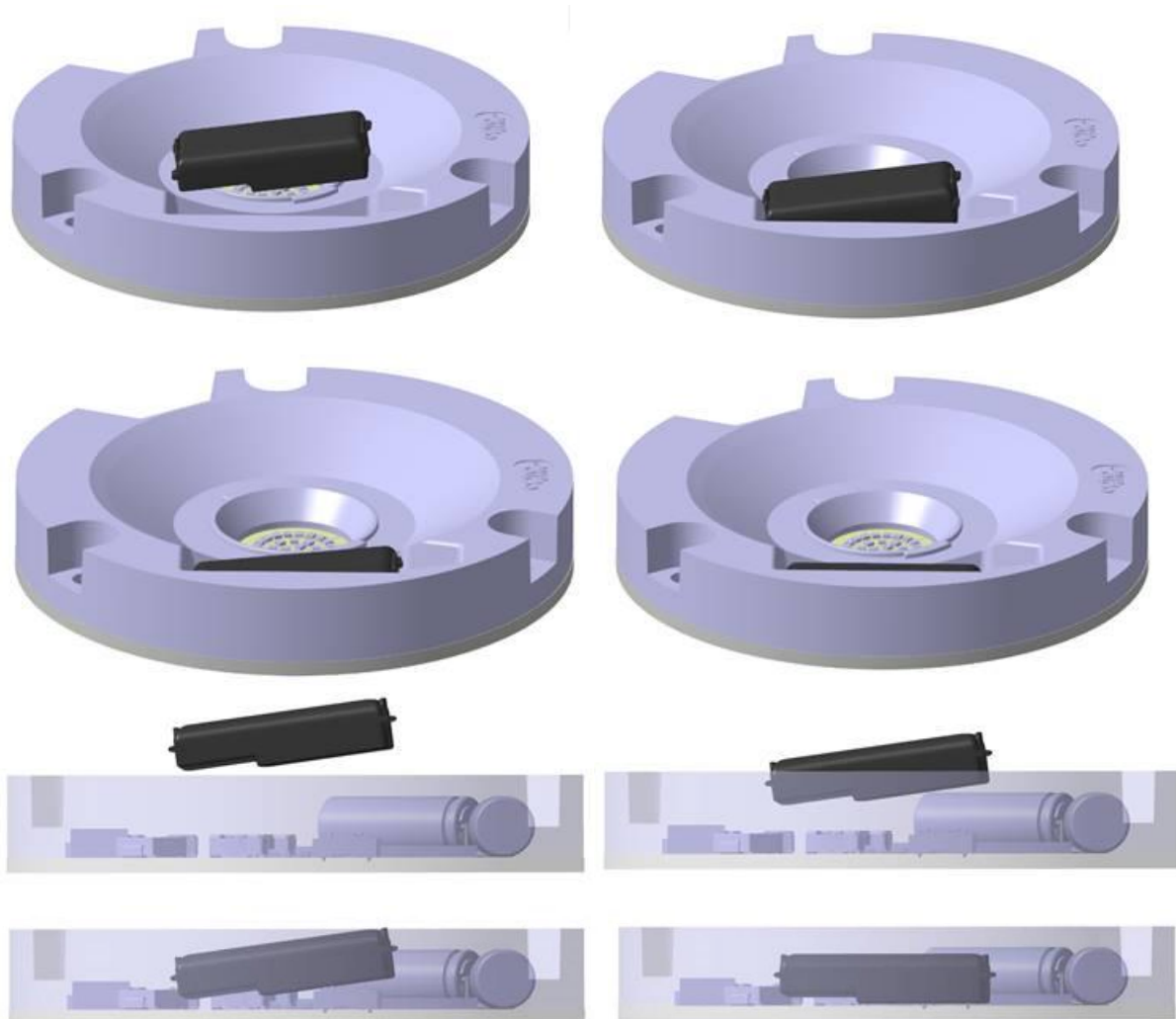


Incoming Wires 110/230VAC

LED Module with IoT (DimIn DALI)



Mounting of DimIn into IoT slot



Here on the left you can see the DimIn unit from below and you can see the connector that is connected to the LED module as well. It is important to insert the front first during assembly, as you can see in the pictures above, then press the rear end and the contact into place. Friction locking between the LED module's safety cover and the DimIn unit's protection locks it in place.

Human Centric Lighting

Human Centric lighting is created with technology for adjustable white control, by changing the colour and intensity of white light, and designing lighting to fit the end-user's lighting needs. A person's natural circadian rhythm can be enhanced with the help of warmer light (which seems relaxing) with low intensity in the morning and evening, and colder light (which provides energy) during a typical work day. The light can also be adjusted to temporary needs during the day. We can use a warmer white light with a slightly lower intensity which helps the user to calm down in stress situations. Or a cooler white light with higher intensity that gives the user energy, for example in the morning.

The spectrum of light in colors plays a different role both in how people look and how they feel. Some parts are needed to make colors appear correctly and other parts affect the circadian cycle. The short-wave light is needed in the morning and a longer wavelength light is better in the evening to have positive effects on the internal biological clock. If people do not get these wavelengths of light at the right times, the ability to fall asleep in the evening is disrupted and it becomes more difficult to get up in the morning. Since man has evolved in the varying light out in nature, it is also what the body has programmed itself to be in and it can have consequences not getting enough of this variation of light. Scientists have found that blue and red light have different meanings for human well-being.

Personal adaptation

Human Centric Lighting usually refers to the possibilities of stimulating the circadian rhythm and our biological clock, but part of HCL is of course the possibility to create a pleasant environment for the moment and individually adapt the lighting. We may want to create a cozy atmosphere before the coffee hour or cheer us up with an extra light boost after lunch, and then there needs to be support for personal adaptation of the light environment. HCL should always consider Visual, Emotional and Non-visual effects, without mutual weighting.

Spectral distribution

In lighting contexts, spectral distribution is a measure of how much energy of certain wavelengths a light source contains. If you compare daylight with incandescent light, both light sources contain the entire visible spectrum, but with a big difference in the amount of blue energy. If we compare it with fluorescent lamps and other discharge light sources, we get a much more fragmented selection of wavelengths that together form white light.

Rods & drops

The light that reaches the eye is received by light-sensitive nerve cells (light receptors) in the retina. They send signals to the brain, which combines the signals into images. Candles with different wavelengths are perceived as different colors. Nerve cells called rods are used to see in the dark, but can not distinguish between different colors. With the drops, on the other hand, you can distinguish different colors. In humans, there are three different types of drops that are sensitive to blue, red and green light.



Retinal ganglioncells

About 20 years ago, a third light receptor was discovered in the retina of the eye, a rare form of so-called retinal ganglion cells. These receptors sense primarily blue light and send signals to the body's "central clock," a small collection of cells in the brain called the suprachiasmatic nucleus. The signals tell the brain to block the production of the hormone melatonin, which helps the body know that it is day.

Biological clock

Our biological clock, the natural circadian rhythm (circadian rhythms) - Our biological clock that controls our needs around sleep, wakefulness, metabolism and other processes is found in a large part of all living organisms, from simple bacteria to animals and humans. The clock goes in cycles with a period of about 24 hours, which stems from the earth's rotation around the sun.

Melatonin

The body's hormone that controls sleep (makes us tired), if your person's melatonin level is out of balance, sleep has a negative effect. At a normal circadian rhythm, melatonin is secreted in the evening to make us tired.

Serotonin

A neurotransmitter needed to produce melatonin, serotonin acts as one of the most important neurotransmitters in the brain and enables nerve cells to communicate with each other. Serotonin regulates most vital functions in the body, such as the sleep-wake cycle, motor skills and the immune system.

How to use Casambi with HCL

A circadian rhythm allows automatic colour temperature management for basic scenes by using a response graph that displays the hours of the day and colour temperature. When a circadian scene is active it will set the colour-temperature based on the response graph. It will adjust the colour temperature for as long as the scene is active. Note: If desired, a circadian profile can also be used in the same scene as daylight control.

A circadian profile can be added to a scene that you are editing. To add a circadian rhythm to a scene, select the Settings icon in the bottom right corner and then choose Circadian rhythm. Select **Add a new profile** and give it a name and push **OK** or choose an existing profile. Graphs from other networks created on the same mobile device can also be imported. To import a graph from another network, simply select the **Import** option and you will then be presented with a list of circadian rhythms from the other networks on your device.

Select the desired profile name and tap on the response graph. You can then adjust the points on the response graph to your requirements. The time of day bar can also be moved left or right to help you select when your circadian rhythm should start and finish. When moving the bar, the time and colour temperature will be shown in the top left.

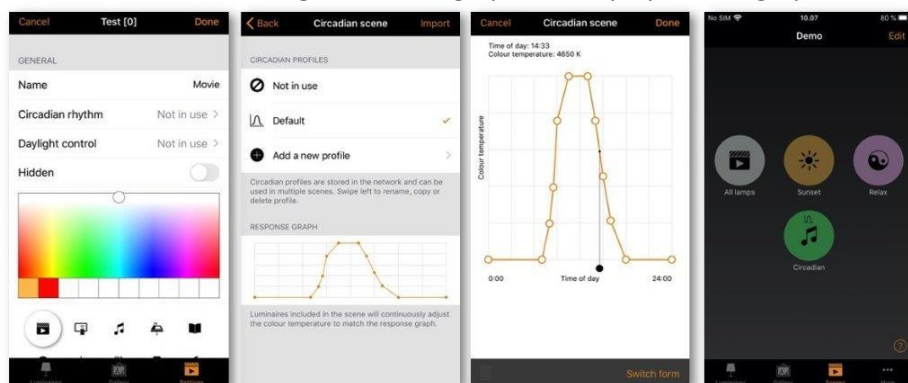
You can add or remove points on the graph. Push and hold on an area on the graph to create a new marker point. Select an existing point to highlight it and then the bin icon in the bottom left to delete the highlighted marker point.

Use the **Switch Form** option to change the response graph form from a smooth graph to a stepped graph.

Select **Done** when your rhythm is complete.

Notes:

- Only tunable white luminaires can follow a circadian profile.
- Multiple circadian rhythms can be created, but only one profile can be used per scene.
- If you need to have a different circadian graph defined for another scene then you need to create a new graph. If you select and edit a graph that has been used in a previous scene the change will also affect the original scene.
- Scenes containing a circadian graph will display a small graph in the scene icon image.





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Photometrical

Flux

Parameter		Symbol	Value			Unit
			Min	Typ	Max	
Luminous Flux	HCL	Φ_v	650		950	lm
Correlated Colour Temperature	27* ⁽²⁾	CCT	2700		6000	K
CRI		R _a		96	-	-
Power		P _o	8		15	W



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Casambi

Tested Parameters with Casambi at 100%

Kelvin		Deviation	Lumen	Colorimetry		Power	CRI
Casambi App	Reality	(K)	CCT	x	y	(W)	
2650	2660	-10	688	0,4614	0,4083	11,2	96,9
2750	2708	42	710	0,4565	0,4057	11,7	96,7
2850	2764	86	733	0,4511	0,4028	12,1	96,5
2950	2824	126	771	0,4456	0,3999	12,5	96,2
3050	2885	165	802	0,4404	0,3972	13,0	96,0
3150	2941	209	822	0,4359	0,3948	13,2	95,8
3350	3104	246	861	0,4239	0,3889	13,3	95,7
3500	3216	284	846	0,4163	0,3848	13,3	95,1
3750	3428	322	871	0,4039	0,3785	13,3	95,2
4000	3644	356	872	0,3924	0,3725	13,3	95,0
4250	3909	341	869	0,3808	0,3665	13,3	94,8
4500	4166	334	904	0,3709	0,3616	13,3	95,5
4750	4448	302	905	0,3611	0,3565	13,3	96,0
5000	4855	145	890	0,3488	0,3502	13,2	96,5
5100	4991	109	867	0,3451	0,3483	12,9	96,8
5200	5119	81	846	0,3417	0,3465	12,5	96,2
5300	5227	73	822	0,3390	0,3452	12,2	96,5
5400	5347	53	802	0,3361	0,3437	11,8	96,8
5500	5391	109	798	0,3350	0,3433	11,3	97,1

Tested parameters with Casambi at 50%

Kelvin		Deviation	Lumen	Colorimetry		Power	CRI
Casambi App	Reality	(K)		x	y	(W)	
2950							
3500							
4000	3698	302	415	0,3901	0,3713	7,41	94,5
4500							
5000							



Köpingsvägen 4
SE-732 31 ARBOGA

Ph: +46 (0)589-490 950
Fax: +46 (0)589-490 950

Web: www.optoga.se
E-mail: info@optoga.se



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Tested parameters with Casambi at 25%

Kelvin		Deviation	Lumen	Colorimetry		Power	CRI
Casambi App	Reality	(K)		x	y	(W)	
2950							
3500							
4000	3703	297	190	0,3898	0,3709	4,47	94,21
4500							
5000							

To be able to use this you need to update the DimIn Casambi from “OptoDrive 1ch” to “Optodrive TW”. This is being made by the Casambi App.



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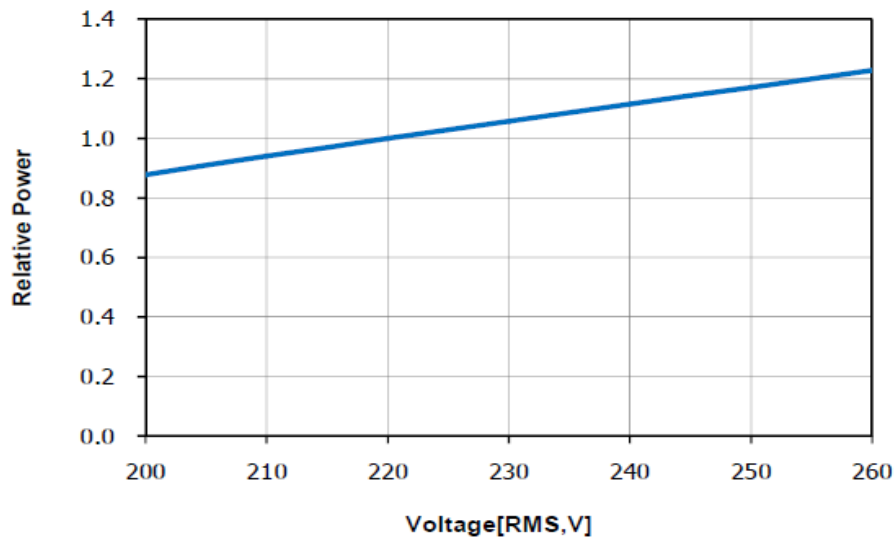
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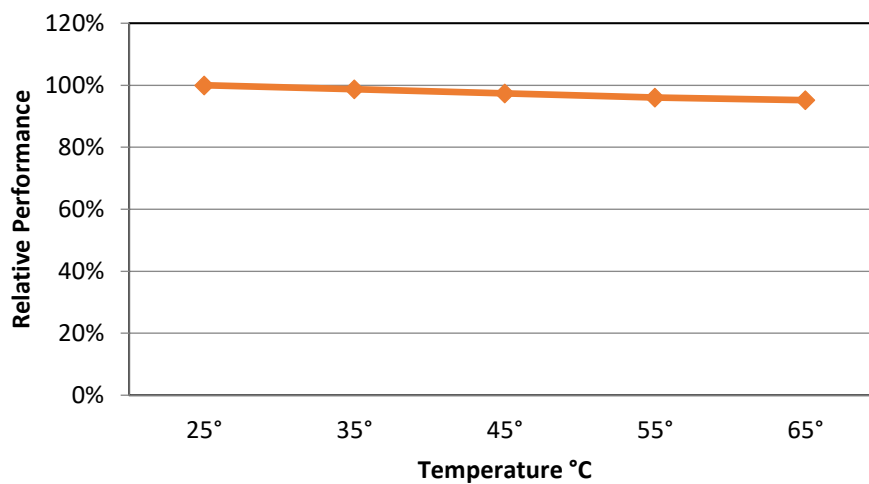
Electrical Optical Data

Current vs. Voltage

With increasing voltage the light output and the heat increases.



Temperature Characteristics



Consider the thermal capabilities of where the LED module is to be fitted. The temperature is an important factor for light output as well as for long time light output degradation.

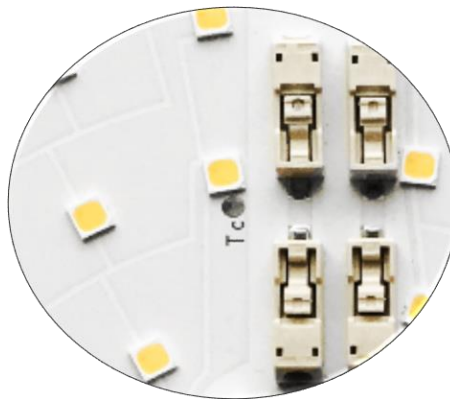
Lifetime (Calculated)

Measurement points

When the measurement takes place you verify that the temperature on the marked measurement points is satisfying. Pending on the result you know what lifetime to expect from the module. This step will be implemented after the heat sink has been connected properly!

The lifetime is calculated at the maximum temperature recommended at the Tc (measuring point). It is important not to exceed this recommendation.

Tc(Surface temperature)	Time for 70% light-output (L70B10)
65°C	>50 000 Hr



Measurement Control

The recommended maximum value is 65°C on Tc or measuring point. If this value is exceeded we cannot guarantee the function and the lifetime of the product. The purpose of the measurement is to control the Junction (Tj) temperature of the LED and also in order to control the performance on the complete setup. By measuring the junction temperature (Tj) the average lifetime of the product is known.

Maximum Temperature

Secure the temperature in your application not to exceed 65°C. Read more in the section “Measurement control”.

Projected lifetime based on TM-21

The power load used with the LED module is according to the “lumen maintenance projection”. It is a LM80 projected lifetime based on discrete LEDs tested in the stated temperature environment at a 30mA power load.



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	55°C	65°C	75°C	85°C
L70B10	>50 000h	>50 000h	>50 000h	>50 000h
L80B10	>50 000h	>47 000h	>38 000h	>33 000h
L90B10	28 000h	24 000h	20 000h	18 000h



Verification of Conformity

The module are under testing at Intertek Semco according to IEC 62031.

Radio Disturbance	IEC 55015:2006 + A1:2007 + A2:2009	
SURGE	IEC 61000-4-5	1 kv
Fast transient BURST	IEC 61547	2 kv
SAFETY	IEC 62031:2008	
Photo Biological Safety	IEC 62471:2008	
Radio Disturbance	IEC 55015:2006 + A1:2007 + A2:2009	
EMC	IEC 61000-3-2:2006	
EMC	IEC 61000-3-3:2008	
ESD*	IEC 61000-4-2	8 kv Air discharge 4 kv Contact discharge

* Please consult the document ESD standards on Optodrive ED, ID and AC

Production Setup

Production in accordance with IPC-6012-B and IPC-A-600G class 2

The LED Module is in accordance to EU Directive 2002/95/EC(ROHS)

The bare PCB is isolation tested with 3000VDC/10mA for 10 seconds

PCB Material Setup

In all questions regarding the bare PCB please use “Material Data sheet Optodrive” as a guideline.

Light fitting routine tests

According to EN/IEC 60598-1 should the routine test be performed as a dielectric strength test or insulation test. Only the insulation test of 500Vdc should be performed according to standard, 1s with min 2MΩ.

No dielectric tests are allowed to be performed on OptoDrive LED Modules.

Precautions for use

- This device should not be used in any type of fluids such as water, oil, organic solvent etc.





- When cleaning is required, use only water together with mild soap on the outside of the lens. Cleaning inside of the LED module is strictly prohibited.
- The appearance and specifications of the product may be modified for improvement without notice.
- Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.
- Opening of the LED module is prohibited due to risk of EMC, dust, grease and other exposures that will damage it.
- The LED Module should always be mounted to a proper heat sink before it's connected with its proper leads.

Handling in regards to static electricity

- The Optodrive products have integrated circuits (IC) on board that may be damaged if exposed to static electricity. Please handle the products only while using equipment that prevents static electricity. Do not handle them without having ESD protection.
- The Optodrive products are not be installed into the end product without proper ESD protection.
- Optodrive LED Modules meet IEC61547:2009 and IEC61000-4-2. We recommend the light fixture manufacturer to take the mentioned standards under consideration.

Storage before use

- Use only properly rated test equipment and tools for the rated voltage and current of the product being tested.
- It is strongly suggested to wear rubber insulated gloves and rubber bottom shoes while handling the product.
- Do not wear any conductive items (such as jewelry) which could accidentally contact electric circuits.
- Faults, lightning, or switching transients can cause voltage surges in excess of the normal ratings.
- Internal component failure can cause excessive voltages.
- Stored or residual electricity in long wire could be hazardous.

ROHS III Compliant

All our LED modules meet the Restrictions of Hazardous Substances (RoHS III)!

There has been a growing consensus that Lead Free Systems should increase for the safety of our environment. It is a very serious problem that lead and other harmful materials are being used in commercial and industrial products, causing more and more environmental problems.



This has led to regulations such as RoHS (Restriction of the use of certain Hazardous Substances) from the EU and the Japan Ministry of Trade and Industry (MITI). All LED module makers providing products to these countries should comply with these restrictions. In order to meet the RoHS III regulation, Optoga is strictly implementing a ban on lead and other hazardous materials in its products. This is in compliance with our responsibilities as good corporate citizens.

Design for Environment:

According to the EU-directive (RoHS III) the following substances must not be used in this product

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Chromium VI (Cr⁶⁺)
- Polybrominated biphenyls PBB
- Polybrominated diphenyl ethers PBDE
- Bis(2-ethylhexyl) phthalate DEPH
- Butyl benzyl phthalate BBP
- Dibutyl phthalate DBP
- Diisobutyl phthalate DIBP

Do you want to know more about benefits of OptoDrive LED?

Read more about OptoDrive at www.optoga.com.

You can contact us via info@optoga.com.

You can also call us on +46 (0)589 490 950.

Optoga AB

Optoga was founded in November 2004 in Arboga, Sweden and has many years of experience in electronics design. The company develops and supplies LEDs and LED-module solutions for the lighting industry, vehicle manufacturers and electronics companies.

With the OptoDrive LED-module, Optoga has taken the initiative to replace strip lights, incandescent and halogen bulbs with LED-based sources.



Köpingsvägen 4 • SE-732 31 Arboga • SWEDEN

Tel +46 (0) 589 490 950

info@optoga.com • www.optoga.com

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